

Notice of Allowability

Application No.

10/521,781

Examiner

Fred M. Teskin

Applicant(s)

SHIBATA ET AL.

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to _____.
2. ☒ The allowed claim(s) is/are 1-9.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

Reasons for Allowance

The following is an examiner's statement of reasons for allowance:

Claims 1-9 are allowable over the closest prior art to Goto et al. Claim 1 requires the use of a catalyst system comprising (A) a cobalt salt, (B1) a phosphine compound having one branched aliphatic group of 3 or more carbon atoms or one alicyclic group of 5 or more carbon atoms and two aromatic groups, and (C) an organic aluminum compound.

Goto et al is directed to a process for producing polybutadiene products, including crystalline 1,2-polybutadiene or a polybutadiene containing crystalline 1,2-polybutadiene segments, using a catalyst comprising (A) a cobalt compound and (B) an organoaluminum compound consisting essentially of an aluminoxane. Other components, such as a tertiary phosphine compound, are described as useable in combination with the components (A) and (B). However, all of the specific tertiary phosphine compounds proposed contain either three aromatic groups (phenyl or benzyl), three cyclohexyl groups, two cyclohexyl groups and one phenyl group, or three linear aliphatic groups (ethyl or butyl; col. 4, ll. 13+). A phosphine compound having one *branched* aliphatic group of 3 or more carbon atoms or *one* alicyclic group of 5 or more carbon atoms and *two* aromatic groups is not taught or fairly suggested.

Moreover, while Goto et al illustrate the production of 1,2-polybutadiene having a melting point of 70°C with a catalyst system comprising dicyclohexyl-phenyl-phosphine (Example 47), a polymerization temperature of 10°C was employed. By contrast, the experimental data presented herein (Tables 1-3) demonstrate that 1,2-polybutadiene

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having a high crystallinity (e.g., 36-37 %) is obtainable at relatively high polymerization temperatures such as 50°C. The comparative experiments show that when using a catalyst comprising a phosphine compound having three aromatic groups (3,5-methyl phenyl), it is necessary to lower polymerization temperature to 30°C in order to obtain an equivalent crystallinity. This results in a longer polymerization time to reach essentially the same conversion degree, which is problematic as a practical matter.

In view of the limited teachings of the prior art as detailed above, applicants' demonstrated production of 1,2-polybutadiene of high crystallinity, at a relatively high polymerization temperature, by use of a catalyst system comprising species of the phosphine compound of the claimed invention must be viewed as an unexpected result indicative of non-obviousness.

Accordingly, claims 1-9 are deemed to define allowable subject matter and are passed to issue.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Citation/Consideration of Pertinent Prior Art

The prior art made of record and not relied upon is considered pertinent to applicants' disclosure.

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Marullo et al is pertinent to the use of triethyl phosphine as a component of a cobalt-based catalyst in the production of crystalline 1,2-polybutadiene (note Example 13).

One et al is pertinent to the use of specific tris(substituted phenyl)phosphine compounds as components of a cobalt-based catalyst system for producing crystalline 1,2-polybutadiene (note Examples 1-7).

The use of a catalyst system comprising a phosphine compound as per the claimed invention is not taught nor fairly suggested by either citation.

The references cited in the Search Report of 28 October 2003 have been considered, but will not be listed on any patent resulting from this application because they were not provided on a separate list in compliance with 37 CFR 1.98(a)(1).

Any inquiry concerning this communication should be directed to Examiner F. M. Teskin whose telephone number is (571) 272-1116. The examiner can normally be reached on Monday through Thursday from 7:00 AM - 4:30 PM, and can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The appropriate fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.


Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



FRED TESKIN
PRIMARY EXAMINER
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FMTeskin/09-06-05